

Criconematidae (Nematoda: Tylenchida) from Soil around Roots of Mulberry in Warm Climate Regions of Japan, with Descriptions of Two New Species

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Four species of Criconematidae were detected from soil around the roots of mulberry in warm climate regions of Japan; Hachijo-shima Is., To-shima Is., Nebukawa of Kanagawa, and Yaku-shima Is. Two of them were identified to be *Hemicriconemoides chitwoodi* and *Crossonema dryum*, and the rest two species were found to be new. *Nothocriconema yakushimense* n. sp. resembles *N. loofi* but differs in possessing a wider distinctive saucer-shaped first annule, a longer stylet, and a smaller number of body annules. *Ogma brevistylum* n. sp. is closely related to *O. lentiforme* but can be distinguished by the sharp scales on body annules, the stylet knobs with slight forwardly directed processes, slightly wider first annule than the second one, and a smaller number of body annules. Morphology of *H. chitwoodi* and *C. dryum* from mulberry fields mostly agreed with their original descriptions. *Jpn. J. Nematol.* **13**:14-19 (1983)

Seven species of five genera of criconematid nematodes, *Criconemella sphaerocephala* (TAYLOR, 1936) (= *Macroposthonia sphaerocephala*), *C. xenoplax* (RASKI 1952) (= *M. xenoplax*), *Neolobocriconema serratum* (KHAN et SIDDIQI, 1963), *Nothocriconemella mutabilis* (TAYLOR, 1936) (= *Nothocriconema mutabile*), *Crossonema multisquamatum* (KIRJANOVA, 1948), *Ogma decalineatum* (CHITWOOD, 1957) (= *Variasquamata gracile* (MEHTA et RASKI, 1971)) and *O. querci* (CHOI et GERAERT, 1975) (= *V. querci*) were reported from mulberry fields in Japan by TOIDA & MOMOTA.⁽⁹⁾ The author has further investigated nematode fauna of mulberry fields and detected additional four species of Criconematidae from soil mainly around mulberry roots in warm climate regions of Japan. Two of the four species were recognized as new species, and the other two were identified to be *Hemicriconemoides chitwoodi* (ESSER, 1960) and *Crossonema dryum* MINAGAWA, 1979. In this paper the two new species are described.

Soil samples were collected from mulberry fields or around the roots of wild mulberry in Hachijo-shima Is. and To-shima Is. of Izu archipelago, Nebukawa of Kanagawa Pref. and Yaku-shima Is. of Kagoshima Pref. Nematodes were separated from soil by the centrifugal flotation method, fixed with TAF after killing by gentle heat, and mounted in glycerin after dehydration. Some specimens for cross sections were mounted in geratin.

NOTHOCRICONEMA YAKUSHIMENSE n. sp.

(Fig. 1, A-H)

Description and measurements

Female paratypes: n=8, L=560 μ m(480-680), a=9(8-11), b=2.8(2.3-3.2), c=13.6(1♀), V=83(82-86), R=54(52-57), RV=11(10-11), Ran=6(1♀), RVan=4(1♀), Rst=14(13-16), Rex=18(16-19), stylet=140 μ m(133-155), prorhabdion=110 μ m(103-115), m=75(72-77), VL/VB=1.8(1.4-2.1).

Holotype: L=570 μ m, a=10, b=2.7, c=13.6, V=84, R=53, RV=11, Ran=6, RVan=4, Rst=16, Rex=18, stylet=138 μ m, prorhabdion=104 μ m, m=75, VL/VB=1.5.

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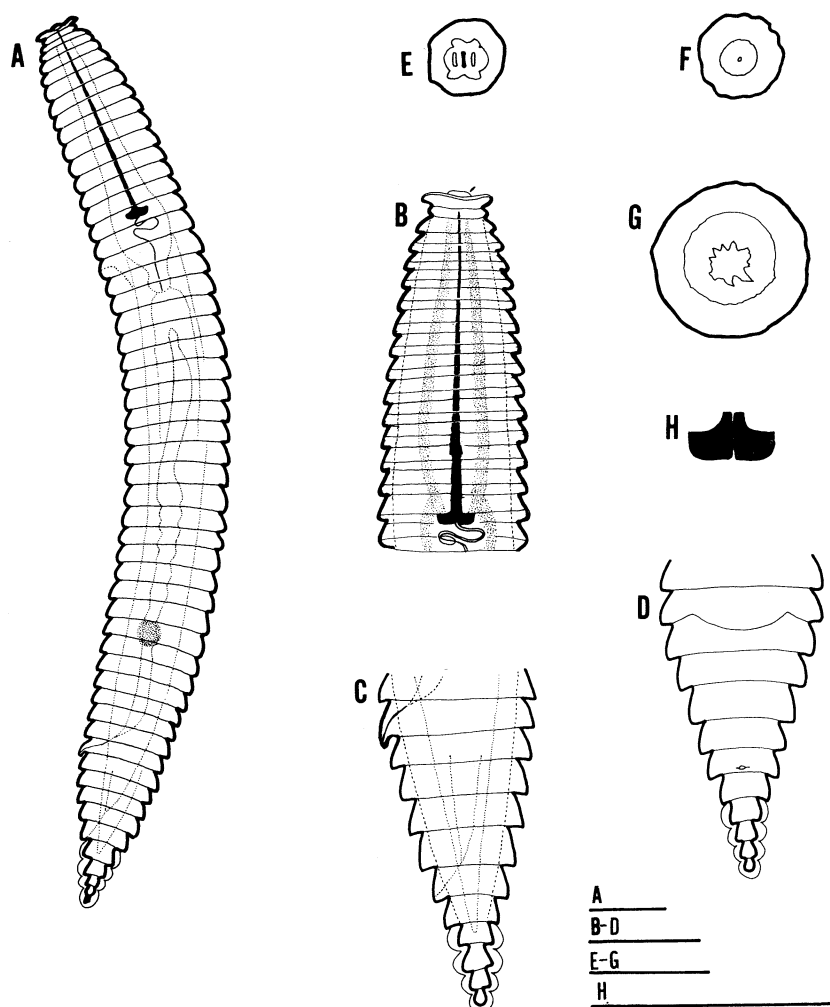


Fig. 1. *Nothocriconema yakushimense* n.sp. Female: A. body, B. anterior portion, C. posterior portion in lateral view, D. posterior portion in ventral view, E. *en face* view, F. cross section at third annule, G. cross section at mid-body, H. stylet knobs. Scales indicate $50\mu\text{m}$.

Body cylindrical, slightly curved ventrally when killed by gentle heat. Head with two annules set off from body, not retrorse, first one ($33\text{--}35\mu\text{m}$ in diameter) saucer-shaped and wider than the second ($24\text{--}29\mu\text{m}$). Lip region elevated, with six pseudolips. Body annules smooth, without anastomosis. Stylet long, slender, basal knobs $12\text{--}17\mu\text{m}$ across, $5.5\text{--}7.5\mu\text{m}$ high, with forwardly directed processes. Excretory pore at 27-35 percent body length from anterior end. Vulva at $75\text{--}98\mu\text{m}$ from posterior end, anterior vulval lip simple with round outline and slightly larger than the posterior one. Spermatheca subspherical, filled with sperms. Anus obscure in most specimens, at $45\mu\text{m}$ from tail tip in a specimens. Tail conical pointed, with narrow elongated annules usually

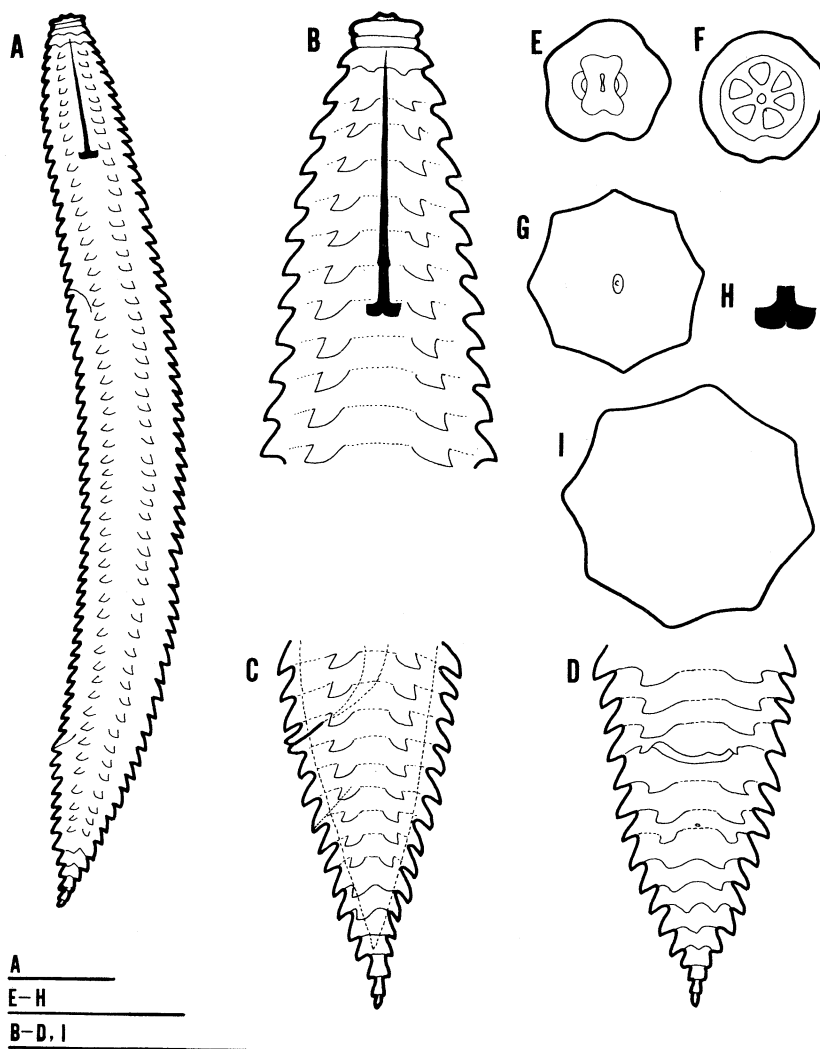


Fig. 2. *Ogma brevistylum* n.sp. Female: A. body, B. anterior portion, C. posterior portion in lateral view, D. posterior portion in ventral view, E. *en face* view, F. cross section at first annule, G. cross section at third annule, H. stylet knobs, I. cross section at mid-body. Scales in A, B-D, I indicate 50 μ m and E-H 20 μ m.

covered with cuticular sheath 3-4 μ m thick (a specimen without sheath among 8 specimens). Ovary single, reaching nearly esophageal basal lobe.

Male: Unknown.

Type specimens

Holotype: Female on slide no. 831. Paratypes: 8 females on slide no. 832. Slides deposited in the Laboratory of Entomology, Sericultural Experiment Station, Yatabe, Tsukuba, Ibaraki Pref.

Type habitat and locality

Specimens were collected from soil around the roots of mulberry, *Morus australis* in Yakushima Branch of Silkworm Egg Experiment Station, Sericultural Experiment Station, Yakushima Is. Kagoshima Pref.

Diagnosis

This species resembles *N. loofi* DE GRISSE, 1967⁴⁾ and *N. palliatum* MINAGAWA, 1981⁸⁾ in having the cuticular sheath on tail tip annules, but differs by a longer stylet (133-155 μ m vs. 89-99 μ m in *N. loofi* and 63.2-72.6 μ m in *N. palliatum*), a saucer-shaped first annule distinctly wider than the second one (the first annule not saucer-shaped, subequals to or slightly wider than the second one in *N. loofi* and *N. palliatum*). *N. yakushimense* n. sp. is also related to *N. jaejuense* CHOI et GERAERT, 1975^{3,8)} in possessing the saucer-shaped first annule and to *N. cardamomi* KHAN et NANJAPPA, 1972⁶⁾ in having a long stylet, but can be distinguished from both species by a wider first annule (33-35 μ m across vs. 26.5 μ m in *N. jaejuense* and 23 μ m in *N. cardamomi*), and a longer stylet (133-155 μ m vs. 80-85 μ m in *N. jaejuense* by the original description or 90-103 μ m by Minagawa⁸⁾ and 100-120 μ m in *N. cardamomi*).

OGMA BREVISTYLUM n. sp.

(Fig. 2, A-I)

Description and measurements

Female paratypes: n=10, L=400 μ m(360-440), a=10(9-11), b=4.0(3.6-4.6), c=10(9.5-12), V=84(82-88), R=64(63-68), RV=13(12-14), Ran=10(9-11), RVan=2(2-3), Rst=10(9-11), Rex=21(20-23), stylet=53 μ m(49-55), prorhabdion=38 μ m(35-40), m=79(76-82), VL/VB=1.7(1.5-2.1).

Female holotype: L=400 μ m, a=9, b=4.4, c=8.2, V=83, R=66, RV=13, Ran=10, RVan=2, Rst=11, Rex=22, stylet=54 μ m, prorhabdion=42 μ m, m=80, VL/VB=1.6.

Head region bluntly truncate, with two annules set off from the body. First annule with rather backwardly directed round margin and slightly wider(14-15 μ m across) than the second one (13-14 μ m) which has forwardly directed margin (first annule equals to the second in a specimen among 10 specimens). Lip region elevated, with marked submedian lobes. Stylet comparatively short, basal knobs small (6-7 μ m across), with slightly forwardly directed processes. Esophageal gland orifice 2-3 μ m posterior to stylet knobs. Esophagus ends at 18-19th annule or 22-28 percent body length from anterior end. Excretory pore at 30-33 percent from anterior end. Outline of body annules in lateral view sharply retrorse like sawteeth. Body annules with eight longitudinal rows of scales decreasing to six on tail region. Scales smaller or obscure on the first body annule and lacking on four annules of tail tip. Scales near both ends with rather round outline, but scales on most body annules with sharp outline. Tail 36-40 μ m long, tapering uniformly to a pointed conoid terminus with elongated narrow annules. A tail tip annule slightly round. Vulva simple with round lips, at 50-60 μ m from terminus. Spermatheca can not be observed. Ovary single, extending to the middle portion of body. Anus indistinctive.

Male: Unknown.

Type specimens

Holotype: Female on slide no. 833. Paratypes: 10 females on slide no. 834. Slides deposited in the Laboratory of Entomology, Sericultural Experiment Station, Yatabe, Tsukuba, Ibaraki Pref.

Type habitat and locality

Specimens were collected from soil around the roots of wild mulberry, *Morus australis*, in Nebukawa, Kanagawa Pref.

Diagnosis

This species is closely related to *O. lentiforme* SCH. STEKHOVEN et TEUNISSEN, 1938⁹⁾ in having eight longitudinal rows of scales on body annules, a sharply conoid tail and a com-

Table 1. Comparisons in measurements of *Hemicriconemoides chitwoodi* and *Crossonema dryum* between from a mulberry field and those of the original description

	<i>Hemicriconemoides chitwoodi</i>		<i>Crossonema dryum</i>	
	The author	Esser, 1960	The author	Minagawa, 1979
Locality	To-shima, Japan	Florida, U.S.A.	Hachijo-shima	Kumamoto
Habitat	Soil around roots of <i>Morus australis</i>	Soil around roots of <i>Camellia</i> sp.	Soil around roots of <i>Morus australis</i>	Soil around roots of <i>Quercus acutissima</i>
n	10 ♀♀	13 ♀♀ 2 ♂♂	5 ♀♀	18 ♀♀
L (μm)	520 (480-540)	540(480-590)	400-424	410-460
a	17 (15-17)	15.5(13.4-17.0)	25.6-26.6	8.5-13.2
b	4.1(3.2-4.7)	3.8(3.5-4.1)		3.1-4.3
c	17 (15-19)	15.7(11.2-21.7)	13.6-14.6	9.0-12.2
V	91 (90-93)	90.1(88.1-91.0)	84-88	82-87
R	119 (116-123)	124(116-133)	52-56	50-55
Rst	21 (20-24)		14-15	
Res	32 (29-34)		16-18	
Rex	34 (31-35)		17-19	16-21
RV	14 (12-15)	12-15	10-11	10-12
Ran	9 (8-10)	9 (1♀)	5-6	5-7
RVan	4 (3-5)		3-4	3-5
stylet(μm)	91 (88-93)	91(85-95)	93-115	86-121
prothadion(μm)	73 (68-78)		85(75-98)	
m	81 (76-84)		84(79-88)	
VL/VB	1.9(1.7-2.1)		1.6(1.4-1.8)	

paratively short stylet (approximately 55μm in *O. lentiforme* when measured from illustration of the original description, while 82μm by ANDRASSY²⁾), but can be distinguished by the scales with sharp outline on body annules (lens-formed scales in *O. lentiforme*), slightly forwardly directed processes of stylet knobs(triangular knobs with backwardly directed processes in *O. lentiforme*), and a smaller number of body annules (63-68 vs. 77). *O. brevistylum* n. sp. also differs from *O. lentiforme* in having the first annule slightly wider than the second one (the first annule narrower than the second in *O. lentiforme* supposedly from the original illustration).

Occurrence of *Hemicriconemoides chitwoodi* in Japan was first reported by AIHARA *et al.*¹⁾ from the soil around *Camellia japonica* in Sagami-hara, Kanagawa. Although this species was found around mulberry roots in To-shima Is., it was very likely that the nematode came from *Camellia*, because the plants were widespread throughout the island. Measurements of the specimens from To-shima were almost equal to those of the original description³⁾.

Crossonema dryum was first described from *Quercus acutissima* in Kumamoto, Japan by MINAGAWA⁷⁾. Measurements of this species from mulberry in Hachijo-shima Is. appeared resembling those of the original description. (Table 1)

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LITERATURE CITED

- 1) AIHARA, T., YUHARA, I. & YAMAZAKI, K. (1983) Seasonal changes in population density and some host plants of the camellia root-knot nematode, *Meloidogyne camelliae*. Jpn. J. Nematol. 12, 33-40. (in Japanese)

- 2) ANDRASSY, I. (1979) Revision of the subfamily Criconematinae Taylor, 1936 (Nematoda). Opusc. zool., Bpest. **16**, 11-57.
- 3) CHOI, Y. E. & GERAERT, E. (1975) Criconematids from Korea with the description of eight new species (Nematoda: Tylenchida). Nematologica **21**, 35-52.
- 4) DE GRISSE, A. (1969) *Contribution to the morphology and the systematics of the Criconematidae* (Taylor, 1936) Thorne, 1949. (Thesis, Gent. Belgium)
- 5) ESSER, R. P. (1960) Three additional species in the genus *Hemicriconemoides* Chitwood and Birchfield, 1957 (Nematoda: Tylenchida). Nematologica **5**, 64-71.
- 6) KHAN, E. & NANJAPPA, C. K. (1972) Four new species of Criconematoidea (Nematoda) from India. Indian J. Nematol. **2**, 59-68.
- 7) MINAGAWA, N. (1979) Description of *Crossonema dryum* n. sp. (Criconematidae: Tylenchida) from Kumamoto, Japan. Jpn. J. Nematol. **9**, 25-27.
- 8) MINAGAWA, N. (1981) *Nothocriconema* from Mt. Aso with descriptions of two new species (Tylenchida: Criconematidae). Jpn. J. Nematol. **10**, 16-26.
- 9) SUHUURMANS STEKHOVEN, J. H. & TEUNISSEN, R. J. H. (1938) Nématodes libres terrestres. Explor. Parc Nat. Albert (Miss. De Witte, 1933-5). Fasc. **22**, 229pp.
- 10) TOIDA, Y. & MOMOTA, Y. (1981) Criconematidae from mulberry fields in Japan. Jpn. J. Nematol. **10**, 27-34.

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和 文 摘 要

本邦暖地のクワ根辺土壌から検出された 2新種を含むCriconematidae科線虫4種の記載

樋 田 幸 夫

八丈島、利島、神奈川県南部および屋久島のクワ根辺土壌から *Hemicriconemoides chitwoodi*, *Crossonema dryum* の2既知種と2新種が検出された。*H. chitwoodi* はわが国では相原(1983)によりツバキから報告され、また、*C. dryum* は皆川(1979)によりクヌギから新種として記載されて以来のもので、両種とも計測値と形態的特徴が原記載にほぼ一致した。

2新種は *Nothocriconema yakushimense* n. sp. および *Ogma brevistylum* n. sp. と命名された。*N. yakushimense* n. sp. は屋久島の桑園土壌から検出され、尾端部がクチャラ状の膜でおおわれる点で *N. loofi* および *N. palliatum* に類似するが、第1体環が大きく、皿状を呈し、口針がより長いなどから明らかに区別される。*O. brevistylum* n. sp. は神奈川県南部の自生シマグワの根辺土壌から分離され、口針が比較的短かく、体環上の鱗片が8列あるなどの点で *O. lentiforme* に類似するが、鱗片が鋭く尖る、口針節球基部両端がやや前方に突出する、第1体環が第2体環よりもわずかに大きい、総体環数が少ないなどの点で区別できる。